

AMENDMENTS TO THE CLAIMS

This listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims

Claim 1 (Currently amended): A position information transmission method for transmitting and receiving road shape information ~~and event information~~, the method comprising the steps of:

at a transmitting side having a first digital map,

~~intermittently~~ selecting nodes in a target road section on ~~[[a]]~~ the first digital map on a predetermined condition;

generating road shape information including the selected nodes;

transmitting the road shape information, ~~wherein the road shape information includes coordinate data of a selected nodes and designates a target road section;~~

at a receiving side having a second digital map,

~~executing a map matching~~ identifying positions of the selected nodes on the second digital map by matching the selected nodes on the second digital map based on the road shape information including coordinate information of the selected nodes;

~~obtaining a road between the selected nodes by using a route search;~~ and

identifying the target road section on the second digital map by performing a route search between the identified positions of the nodes in the second digital map. [[;]]

~~wherein said steps of selecting nodes and transmitting road shape information are executed at a transmitting side, and~~

~~wherein said steps of executing a map matching, obtaining a road, and identifying the target road section are executed at a receiving side.~~

Claim 2 (Currently amended): The method according to claim 1, wherein the road shape information transmitted from the transmitting side includes supplementary information indicating attributes of the selected nodes, and wherein the receiving side references the supplementary information in the step of executing a ~~[[map]]~~ matching in order to determine the positions of the nodes.

Claim 3 (Currently amended): The method according to claim 2, wherein the supplementary information indicating the attributes of the nodes includes at least one of a ~~node-road~~ type, a ~~node-road~~ name, a road number, a number of intersections between selected nodes, a number of connecting links, angles between connecting ~~links-roads,~~ functional road class, form of way, intersection type, driving direction, and ~~an intercept~~ azimuth information at the selected node.

Claim 4 (Canceled)

Claim 5 (Original): The method according to claim 1, wherein the road shape information transmitted from the transmitting side includes supplementary information indicating attributes of links included between the selected nodes, and

wherein the receiving device references the supplementary information during using the route search in the step of obtaining the road between the nodes.

Claim 6 (Currently amended): The method according to claim 5, wherein the supplementary information indicating the attributes of the links includes at least one of a road type, a road number, ~~[[and]]~~ a link type, and a distance between nodes.

Claim 7 (Currently amended): The method according to claim 1, wherein the transmitting side selects a plurality of nodes ~~arranged around the selected node in the step of intermittently selecting nodes in the target road section~~ in at least a part of the target road section more thickly than in another part and transmits the road shape information including the coordinate data of each selected node, and

wherein said nodes representing said predetermined section are selected more thickly than another section.

Claim 8 (Canceled)

Claim 9 (Original): The method according to claim 1, further comprising the steps of:

comparing a setting date of the digital map data of the road in the target road section with a regulated date; and

transmitting the road shape information including data representing the road shape in the target road section, in case of that the setting date is later than the regulated date;

wherein the steps of the comparing a setting date with a regulated date and transmitting the road shape information are executed at the transmitting side.

Claim 10 (Previously presented): The method according to claim 1,
wherein the road shape information transmitted from the transmitting side includes a setting date that the digital map data of the road in the target road section was set, and

wherein the step of identifying the target road section is skipped in case of that the setting date is later than a creation date of a digital map data which the receiving side owns.

Claim 11 (Currently amended): The method according to claim 1,
wherein the road shape information transmitted from the transmitting side includes distance data between the ~~intermittently~~ selected nodes, and

the method further comprising the step of:

comparing the distance data of the road connecting the nodes obtained by way of the route search and the distance data between the nodes in the road shape information; and

discriminating propriety of the route search;

wherein the steps of the comparing the distances and discriminating the propriety are executed at the receiving side.

Claim 12 (Currently amended): The method according to claim 1, further comprising the steps of:

~~evaluating an accuracy of the matching of nodes in the target road section;~~
~~and~~

determining a length of the target road section or number of the nodes in the road shape information based on ~~the result of the step of evaluating;~~

~~wherein the steps of the evaluating the accuracy and determining the length are executed at the transmitting side~~ a distance from the selected nodes in the target road section to a closest point on the adjacent road section, or based on a difference between azimuth information of the selected nodes in the target road section and azimuth information of the adjacent road section.

Claim 13 (Canceled)

Claim 14 (Currently amended): A position information transmission apparatus for transmitting road shape information to specify [[the]] a target road section on a digital map, the apparatus comprising:

position information converting means for selecting the target road section;

transmit node extracting means for ~~intermittently selecting nodes in the road shape information out of the nodes arranged on the target road section; and~~ from the target road section on the digital map on a predetermined condition;

generating road shape information including the selected nodes of the target road section; and

transmitting means for transmitting ~~the selected nodes of the target road section~~ the road shape information.

Claim 15 (Currently amended): A position information receiving apparatus for receiving road shape information designating a target road section on a digital map and for specifying the target road section based on the road shape information, the apparatus comprising:

map matching means for performing map matching to ~~determine~~ identify positions of selected nodes included in the road shape information on the digital map; and

route search means for ~~obtaining the road connecting the nodes determined~~ performing a route search between identified positions of the nodes on the digital map to ~~reproduce~~ identify the target road section.

Claim 16 (Original): The position information receiving apparatus according to claim 15,

wherein the map matching means executes a map matching based on node information of some of the nodes included in the road shape information to determine the positions of the nodes on a digital map.

Claim 17 (Canceled)

Claim 18 (Currently amended): A method for identifying position of a target road section on a digital map, said method comprising the steps of:

- at a transmitting side having a first digital map,
- selecting nodes including coordinate information from the target road section on the first digital map on a predetermined condition;
- creating position information of the target road section on a first digital map ~~using the selected nodes, wherein said position information includes coordinate information of nodes selected from the target road section;~~
- sending said position information of the target road section;
- at a receiving side having a second digital map,
- receiving said position information of the target road section;
- calculating a path ~~connecting~~ between positions of said selected nodes on the second digital map based on said coordinate information; and
- identifying position of said target road section on the second digital map based on the calculated path.

Claim 19 (Previously presented): The method according to Claim 18, wherein, in the step of calculating the path between the selected nodes, said receiving side calculates the shortest path between said selected nodes.

Claim 20 (Previously presented): The method according to Claim 18, wherein said nodes are intermittently selected from the target road.

Claim 21 (Currently amended): ~~[[A]]The method for identifying position of a target road section on a digital map, said method comprising the steps of~~
according to claim 18:

~~at a transmitting side having a first digital map,~~
~~creating wherein the position information of the target road section on the~~
~~first digital map, wherein said position information includes nodes intermittently~~
~~selected from said target road section and representing said target road section,~~
~~coordinate information of the selected nodes, and includes supplementary~~
~~information; and~~

wherein at least one of the calculating step and the identifying step is
performed with using the supplementary information.

~~sending said position information of said target road section;~~
~~at a receiving side having a second digital map,~~
~~receiving said position information of said target road section;~~
~~calculating a path connecting the selected nodes on a second digital map with~~
~~referring to at least the supplementary information; and~~
~~identifying position of said target road section on the second digital map~~
~~based on said calculated path.~~

Claim 22 (Previously presented): The method according to any one of
claims 18 to 21,

wherein said position information includes a node on a intersection.

Claim 23 (Previously presented): The method according to any one of the claims 18 to 21,

wherein said position information includes a node on any points between intersections.

Claim 24 (Previously presented): The method according to any one of claims 18 to 20,

wherein said position information includes a node in the middle of distance between intersections or in the vicinity of the middle of distance between intersections.

Claim 25 (Previously presented): The method according to Claim 21, wherein said supplementary information indicates attribute of the selected nodes.

Claim 26 (Previously presented): The method according to Claim 21, wherein said supplementary information indicates attribute of a path between said selected nodes.

Claim 27 (Currently amended): The method according to Claim 25, wherein said attribute of nodes indicates any one of a road type, ~~an intercept azimuth, a crossing link angle, and a road name, at each nodes~~ a road name, a road number, a number of intersections between the selected nodes, a number of connecting links, angles between connecting roads, functional road class, form of

way, intersection type, driving direction, and azimuth information at the selected node.

Claim 28 (Currently amended): The method according to Claim 26,
wherein said attribute of path indicates any one of a length and a road type, a road number, a link type, and distance between nodes of the path.

Claim 29 (Previously presented): A method for identifying position of a target road section on a digital map, said method comprising the steps of:
at a transmitting side having a first digital map,
creating position information of the target road section, wherein said position information includes coordinate information of nodes selected from the target road section and at least a part of said nodes represent a shape of a predetermined section of the target road section;
sending said position information of the target road section;
at a receiving side having a second digital map,
identifying position of said predetermined section on the second digital map by using said shape;
calculating a path of the other section on the second digital map; and
identifying position of the target road section on the second digital map based on the identified position of said predetermined section and the calculated path.

Claim 30 (Previously presented): The method according to claim 29,
wherein said nodes representing said predetermined section are selected more
thickly than the other section.

Claim 31 (Previously presented): The method according to claim 29,
wherein said predetermined section is a section which is estimated to cause
an error matching at the sending side, or a section which is estimated to cause a
miscalculation of a path thereof at the sending side.

Claim 32 (Previously presented): The method according to claim 29,
wherein said predetermined section falls into one of a section to which plural
roads run parallel and a section having a possibility that plural paths are calculated.

Claim 33 (Currently amended): An apparatus for providing position
information indicating a target road section on a first digital map to a receiving side
having a second digital map so that the receiving side can identify the target road
section on the second digital map, said apparatus comprising:

means for identifying a target road section on a digital map;
means for ~~intermittently~~ selecting node groups from points arranged on the
target road section on a first digital map on a predetermined condition;
~~means for obtaining coordinate information of the selected node groups;~~
means for creating position information ~~from the obtained coordinate~~
~~information using the selected nodes~~; and
means for transmitting the position information to the receiving side.

Claim 34 (Currently amended): An apparatus for providing position information indicating a target road section on a first digital map to a receiving side having a second digital map so that the receiving side can identify the target road section on the second digital map, said apparatus comprising:

- means for identifying a target road section on a first digital map;
- means for selecting a predetermined section from the target road section;
- means for ~~intermittently~~ selecting nodes from points arranged on the target road section in such manner that nodes are selected more thickly in the predetermined section than the other section of the target road section;
- means for obtaining coordinate information of the selected nodes;
- means for creating position information from the obtained coordinate information; and
- means for transmitting the position information to the second digital map.

Claim 35 (Currently amended): An apparatus for identifying position of a target road section on a digital map at a receiving side based on position information including supplementary information on a digital map at a transmitting side, said apparatus comprising:

- means for receiving the position information;
- means for determining position of nodes representing the target road section on the digital map at the receiving side based on the received position information ~~on the digital map at the transmitting side;~~
- means for calculating a path ~~connecting~~ between the identified nodes; and

~~means for identifying position of the road section on a digital map at a receiving side; and~~

means for ~~reproducing~~ identifying the target road section on ~~[[a]]~~ the digital map at ~~[[a]]~~ the receiving side using the path,

wherein at least one of the calculating step and the identifying step is performed using the supplementary information.

Claim 36 (Currently amended): ~~[[An]]~~ The apparatus according to claim 35, for identifying position of a target road section represented by position information, said apparatus comprising:

~~a digital map;~~

~~means for determining position of nodes representing the target road section based on the position information;~~

~~means for calculating a path connecting the nodes;~~

~~means for identifying position of the road section; and~~

~~means for reproducing the road section;~~

wherein said ~~position identification~~ means for identifying identifies the position of the target road section on the digital map based on ~~the coordinate information of~~ at least one of the nodes included in the position information.

Claims 37–39 (Canceled)

Claim 40 (Previously presented): A method for identifying a first road section on a first digital map, and identifying a second road section, corresponding to the first road section, on a second digital map, the method comprising the steps of:

- selecting the first road section on the first digital map;
- selecting first plural points located on the first road section, on the first digital map;
- creating location information indicative of coordinates of the first plural points on the first digital map;
- identifying plural second points, corresponding to the first plural points, on the second map with reference to the location information;
- calculating a path connecting the second plural points on the second map; and
- identifying the second road section on the second map based on the path.

Claim 41 (Previously presented): A method for identifying a first road section on a first digital map, and identifying a second road section, corresponding to the first road section, on a second map, the method comprising the steps of:

- selecting the first road section on the first digital map;
- extracting a part of the first road section as a predetermined section on the first digital map;
- selecting first plural points located on the first predetermined section on the first digital map;
- creating location information indicative of coordinates of the first plural points on the first digital map;

creating positional information indicative of a relative positional relationship between the first road section and the first predetermined section on the first digital map;

identifying plural second points, corresponding to the first plural points, on the second map with reference to the location information;

identifying a second predetermined section, corresponding to the first predetermined section, on the second digital map based on the plural second points; and

identifying the second road section on the second map based on the second predetermined section and the positional information.

Claim 42 (Previously presented): The method according to claim 40 or 41, wherein the coordinate information indicates an absolute coordinate of one of the first plural points as the coordinate of the one of the first plural points, and a relative positional relationship between the one of the first plural points and another one of the first plural points as the coordinate of the other one of the first plural points.

Claim 43 (Previously presented): The method according to claim 40 or 41, wherein the first plural points include a start node and an end node of the first road section on the first digital map.

Claim 44 (Canceled)

Claim 45 (New): The method according to claim 1 further comprising determining whether or not a part of the target road section in the road shape information is to be represented by nodes, which is selected thickly based on at least one of the following: a distance from the selected nodes in the target road section to a closest point on an adjacent road section, or a difference between azimuth information of the selected nodes in the target road section and azimuth information of the adjacent road section.

Claim 46 (New): A receiving apparatus for identifying a position of a target road section on a digital map, said receiving apparatus comprising:

receiving means for receiving position information from transmitting side in which at least a part of nodes selected from the target road section represent a shape of a predetermined section of the target road section;

identifying means for identifying the predetermined section on the digital map using the received position information; and

calculating means for calculating a path of the other section on the digital map,

wherein the identifying means identifies the position of the target road section on the digital map based on the predetermined section and the calculated path.

Claim 47 (New): The receiving apparatus of claim 46,
wherein said nodes representing said predetermined section are selected more quickly than the other section.

Claim 48 (New): The receiving apparatus according to claim 46,
wherein said predetermined section is any one of the following: a section
which is estimated to cause an error matching at the transmitting side, or a section
which is estimated to cause a miscalculation of a path thereof at the transmitting
side.

Claim 49 (New): The receiving apparatus according to claim 46,
wherein said predetermined section falls into one of a section to which plural
roads run parallel and a section having a possibility that plural paths are calculated.

Claim 50 (New): An apparatus for identifying position of a target road
section on a digital map at a receiving side based on position information on a
digital map at a transmitting side and event information, said apparatus comprising:
means for receiving the position information and the event information;
means for determining position of nodes representing the target road section
on the digital map at the receiving side based on the position information on the
digital map at the transmitting side;
means for calculating a path connecting the nodes;
means for identifying position of the road section on the digital map at the
receiving side; and
means for reproducing the event information in the road section on the digital
map at the receiving side.

Claim 51 (New): The apparatus according to claim 50,
wherein said means for identifying identifies the position of the target road
section on the digital map based on at least one of the nodes including in the
position information.